formation method is an inverse operation of the above second transformation method. An example of the second inversion transformation method is IMDCT.

[0389] Operations **4040** and **4050** may be embodied as various transformation methods in which signals being divided into units of predetermined bands and represented in the time domain or the frequency domain are received and transformed into the time domain. An example of such a transformation method is FV-MLT.

[0390] Then a high-frequency band signal is decoded using a low-frequency band signal that is the result of demultiplexing in operation **4000**, based on the information for decoding a high-frequency band signal by using a low-frequency band signal (operation **4060**).

[0391] Next, the low-frequency band signal being inversely transformed in operation **4050** and the high-frequency band signal decoded in operation **4060** are mixed together (operation **4070**).

[0392] Thereafter a mono signal that is the result of inversely transforming in operation **4050** is upmixed to a stereo signal by using the parameters for upmixing a mono signal to a stereo signal (operation **4080**). Examples of the parameters are the difference between the energy levels of two channels, and the correlation or coherence between the two channels.

[0393] The present general inventive concept can be embodied as computer readable code in a computer readable medium, wherein the computer includes apparatuses with information processing functions. The computer readable medium may be any recording apparatus capable of storing data as a program that is read by a computer system, e.g., a read-only memory (ROM), a random access memory (RAM), a compact disc (CD)-ROM, a magnetic tape, a floppy disk, an optical data storage device, and so on.

[0394] The audio and/or speech signal encoding and decoding method and apparatus according to the present general inventive concept are capable of effectively encoding and decoding all a speech signal, an audio signal, and a mixed signal thereof. Also, encoding and decoding can be performed using a small number of bits, thereby improving the quality of sound. A single codec can be used to perform the encoding and/or decoding operations of the above-described audio and/or speech signal encoding and decoding method and apparatus.

[0395] Although a few embodiments of the present general inventive concept have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the general inventive concept, the scope of which is defined in the appended claims and their equivalents.

What is claims is:

1. A method of decoding a signal of audio and/or speech, the method comprising:

determining whether the signal is encoded in a frequency domain or a time domain based on mode information from a bitstream;

decoding, performed by using at least one processing device, the signal in the frequency domain, if it is determined that the signal is encoded in the frequency domain;

decoding, performed by using at least one processing device, the signal in the time domain, if it is determined that the signal is encoded in the time domain; and

upmixing a mono signal including the signal decoded in either the frequency domain or the time domain and a generated high frequency band signal to a stereo signal by using parameters for upmixing the mono signal to the stereo signal, in a structure of performing decoding of the signal through switching between the frequency domain and the time domain.

2. The method of claim **1**, wherein in the determined domain, the signal is to be represented in predetermined units.

3. The method of claim **1**, wherein:

the signal comprises a low-frequency band signal.

4. The method of claim **1**, wherein the decoding of the signal in the determined domain comprises:

decoding one or more spectral components for one or more units that are determined as having been encoded in the frequency domain; and

decoding remnant spectral components excluding the decoded spectral components.

5. The method of claim **1** further comprising:

transforming the mono signal including the signal decoded in either the frequency domain or the time domain to a representation in a time-frequency domain,

wherein the upmixing the mono signal comprises upmixing the mono signal, represented in the time-frequency domain, and the generated high frequency band signal to the stereo signal.

6. An apparatus to decode a signal of audio and/or speech, the apparatus comprising:

a demultiplexing unit to determine whether the signal is encoded in a frequency domain or a time domain based on mode information from a bitstream;

a first decoding unit, implemented by using at least one processing device, to decode the signal in the frequency domain, if it is determined that the signal is encoded in the frequency domain;

a second decoding unit, implemented by using at least one processing device, to decode the signal in the time domain, if it is determined that the signal is encoded in the time domain; and

an upmixer to upmix a mono signal including the signal decoded in the determined domain and a generated high-frequency band signal to a stereo signal by using parameters for upmixing the mono signal to the stereo signal, in a structure of performing decoding of the signal through switching between the frequency domain and the time domain.

7. The apparatus of claim **6**, further comprising:

a domain transformation unit to transform the mono signal including the signal decoded in either the frequency domain or the time domain, to a representation in a time-frequency domain,

wherein the upmixer upmixes the mono signal, represented in the time-frequency domain, and the generated high frequency band signal to the stereo signal.

8. A method of decoding a signal of audio and/or speech, the method comprising:

determining whether the signal is encoded in a frequency domain or a time domain based on mode information from a bitstream;

decoding, performed by using at least one processing device, the signal in the frequency domain, if it is determined that the signal is encoded in the frequency domain;